

EFFECT OF REFRIGERATION ON EGG INCUBATION PERIOD OF THE TASAR SILK INSECT *ANTHRAEA MYLITTA* DRURY (SATURNIIDAE)

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Antheraea mylitta Drury is a semidomesticated tasar silk insect reared thrice in a year during July–August, September–October and November–December. January to middle of June is the diapause period. In recent years, 40–60 percent of fertile egg production from May to mid-June has gone unutilized for rearing due to lack of quality leaves in tasar food plants and excessive outdoor temperatures ($39 \pm 4^\circ\text{C}$). This situation causes loss and scarcity of eggs for subsequent commercial tasar crops. It would be desirable to prolong egg incubation by some suitable means to enable utilization of those eggs at the onset of the favorable rearing period, and to synchronize hatching of all egg batches for simultaneous rearing.

The egg of *A. mylitta* normally requires seven days of incubation at room temperature, and hatches on the eighth day after oviposition. Refrigeration is a common means to delay hatching of other silkworm eggs. Information is available on the effect of low temperature on the incubation periods of the mulberry silkworm, *Bombyx mori* L. (Tayade, D. S., M. D. Jawale & P. K. Unchegaonkar 1987, *Sericologia* 27:297–299) and the Eri silkworm, *Philosamia ricini* H. (Choudhury, S. N. 1982, Eri silk industry, Directorate of Sericulture and Weaving, Govt. of Assam, Gauhati, 177 pp.; Viswakarma, S. R. 1982–83, *Indian J. Seric.* 21–22:36–39). Since no information was available on the effect of refrigeration of eggs of *A. mylitta*, this investigation was made.

In the Mayurbhanj district of Orissa, India, 29,000 freshly oviposited eggs were collected from 290 DFL's (disease free layings from 290 healthy mated females) of the Sukinda trivoltine race of *A. mylitta* on 22 May 1987 at 0900 h, and were kept at room temperature ($31 \pm 2^\circ\text{C}$) as a common stock. Every day at 0900 h from the first to seventh day after oviposition, 4000 eggs (40 DFL's) were taken from the common stock and divided into four equal groups for 1, 2, 3, and 4 days of refrigeration treatment at $10 \pm 1^\circ\text{C}$, after which they were again allowed to incubate at room temperature until hatching. The remaining 1000 eggs (10 DFL's) served as the control. The incubation period of the treated groups was then compared with the control. The experiment was repeated five times during the same period and under the same conditions.

The incubation period of control eggs was seven days. One and two days of refrigeration of 1st- (fresh or 0-day-old) and 2nd-day (1-day-old) eggs increased the incubation period to 12 days (Table 1), 5 days more than the control. Three and four days of treatment to such eggs increased the incubation period to 13 days (Table 1), 6 days more than the control.

One and two days of refrigeration increased the incubation period by two days beyond the control in 3rd- (2-day-old), 4th- (3-day-old), and 5th-day (4-day-old) eggs, and by

TABLE 1. Incubation period of *Antheraea mylitta* eggs refrigerated at different ages for different periods.

Day after oviposition	Age of eggs (days)	Incubation period when refrigerated for:			
		1 day	2 days	3 days	4 days
1st	0 (fresh eggs)	12	12	13	13
2nd	1	12	12	13	13
3rd	2	9	9	11	11
4th	3	9	9	10	10
5th	4	9	9	11	11
6th	5	8	8	10	10
7th	6	8	8	9	9

TABLE 2. Analysis of variance.

Source of variation	df	SS	MS	F
Between refrigeration periods	3	61.71	10.28	108.27*
Between ages	6	14.28	4.76	50.12*
Error	18	1.71	0.09	—
Total	27	77.71	—	—

Critical difference ($P < 0.05$) for refrigeration period = 0.35

* Significant ($P < 0.05$).

one day in 6th- (5-day-old) and 7th-day (6-day-old) eggs. Similarly three and four days of refrigeration increased the incubation period by four days in 3rd- and 5th-day eggs, by three days in 4th- and 6th-day eggs, and by two days in 7th-day eggs.

The data were analyzed as two-way classified. There is significant variation ($P < 0.05$) among different refrigeration treatments as well as among different ages of eggs; further, the critical difference indicates that the two-day refrigeration treatment differed significantly from the three-day (Table 2).

Thus the fresh and one-day-old eggs of *A. mylitta* refrigerated for three and four days showed maximum increase of the incubation period amounting to six days. Viswakarma (above) observed that the incubation period of *P. ricini* eggs when refrigerated at $7 \pm 2^\circ\text{C}$ for five days increased by four to five days. Choudhury (above) reported prolongation of the incubation period of *P. ricini* eggs by four days of refrigeration at 15°C . Tayade et al. (above) observed one or two days extension of the incubation period in *B. mori* eggs with increase of refrigeration at 5°C to 55 days. Studies on the effect of different degrees of temperature on incubation and embryonic development of *A. mylitta* eggs should be carried out.

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